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Shielding Charged Particle Beams

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Momentum measurements in the forward direction at collider experiments are inherently difficult as the deflection of charged particles to be observed requires a magnetic field component that is perpendicular to the propagation direction of those particles. This, in turn, would jeopardize the quality of the colliding beam particles. To overcome this difficulty we propose a magnetic cloak that is passively shielding the beam particles from any transverse magnetic field component and furthermore, maintain the character of the magnetic field. This would allow introducing dipole magnets in the forward region of any experiment at a collider, for instance, the Electron-Ion Collider.

We present a possible setup and show the design parameters, fabrication, and limitations of a magnetic field cloak

Summary

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